

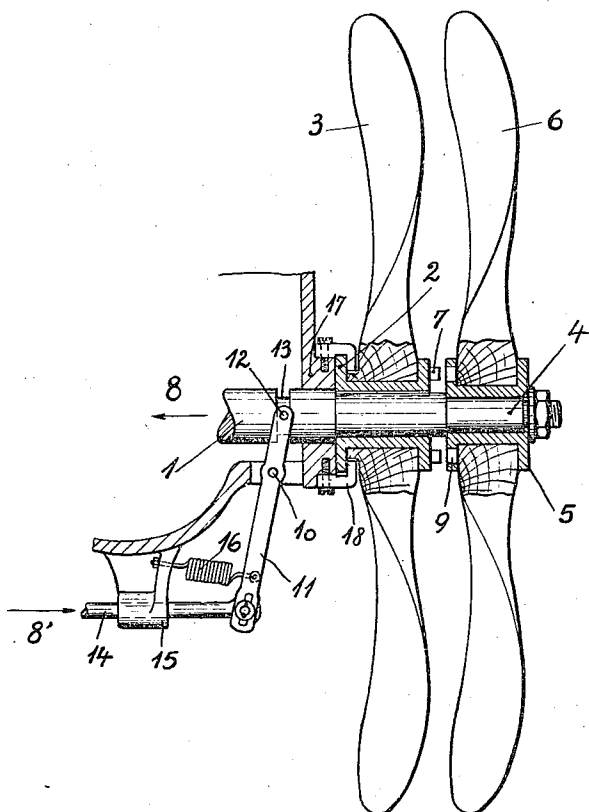
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C. DORNIER

AIR PROPELLER

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INVENTOR:

Claudio Dornier
by *Dornier*
Attorney.

UNITED STATES PATENT OFFICE.

CLAUDIUS DORNIER, OF FRIEDRICHSHAFEN, GERMANY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE FIRM DORNIER-METALLBAUTEN, GESELLSCHAFT MIT BESCHRÄNKTER HAFTUNG, OF FRIEDRICHSHAFEN, GERMANY, AND CLAUDIUS DORNIER, OF FRIEDRICHSHAFEN, GERMANY.

AIR PROPELLER.

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To all whom it may concern:

Be it known that I, CLAUDIUS DORNIER, a citizen of the German Empire, residing at Friedrichshafen, Germany, have invented certain new and useful Improvements in Air Propellers, of which the following is a specification.

My invention refers to air propellers, and more particularly to an arrangement thereof which will render it possible to utilize the motor power to its full limits even at great height.

As may be known, the motor output is kept constant up to very considerable altitudes by the most diverse means. It is therefore imperative that the propeller shall transmit this said output entirely to the air without any considerable increase in the number of its rotations.

Up to the present, the rigid wooden propeller was dimensioned for an average height. This, however, only allowed of a rather unsatisfactory utilization of the motor power. Attempts were therefore made to obtain an adaptation to the conditions as they gradually altered by means of adjustable air propellers. The majority of the forms of constructions proposed in connection with adjustable propellers of this kind, however, relates to extremely complicated propeller structures so that the adaptability required is only obtained by the addition of very considerable drawbacks.

My invention is intended to remedy these defects by providing a system of arrangement for the propellers of aircraft which will allow of such an adjustment of the drive for the said air propellers as will fully comply with the actual requirements, and in the case of which two two-bladed air propellers of either the same or different dimension are so disposed the one to the rear of the other that, according to the prevailing power or speed conditions of the motor only one of said propellers, or else both, can be coupled to the driving shaft.

Thus at low heights one of the propellers only will act as the driving propeller, while the other will, for the present, run light. Only at a greater height, at which the over-compressed motor yields an excess beyond the propeller capacity, the second propeller, which is arranged either directly to the rear

or in front of the other propeller, is likewise coupled to the driving shaft so that in this manner a four-bladed propeller will be produced, which is capable of transmitting the full motor output to the air even at a considerably greater height. In this connection I have found it expedient when interconnecting the second propeller to take due care that the coupling shall be effected in such a manner that the wing blades will be displaced at 90° relatively to each other as required for a four-bladed propeller. In this case, the two propellers must be interlocked, say, by means of a claw coupling or the like. For the rest, use may be made of any method of coupling desired.

The two propellers are preferably of equal size; however, there is the possibility of obtaining a better adaptation to the peculiar conditions prevailing in each single case by making them of different sizes. Moreover, by altering the angle of the main propeller with respect to the auxiliary propeller, there may be secured a suitable regulation of the capacity, and this, for instance, in such wise that the angle will only gradually be augmented to 90°, so that the maximum capacity will be obtained only by steps.

In conclusion let it be noted that the coupling may be effected either indirectly or directly automatically in mere dependency upon the speed of the motor or the barometric air pressure, and this, for example, in such a manner that as soon as the speed exceeds a certain maximum, the auxiliary propeller will be thrown into action.

In the drawings affixed to this specification and forming part thereof a propeller system embodying my invention is illustrated by way of example.

Referring to the drawings there is keyed upon the driving shaft 1 the hub 2 of the main propeller 3, whereas the hub 5 of the auxiliary propeller 6 is rotatably mounted on the slightly reduced end 4 of the said shaft. The hub 2 of the main propeller 3 is provided with a toothed coupling member 7 which, when the driving shaft 1 executes an axial motion in the direction indicated by the arrow 8, is adapted to engage suitable notches 9 formed in the hub 5 of the auxiliary propeller 6. Axial displacement of the shaft 1 can be effected by aid

of a double armed lever 11 pivoted to the casing at 10 and carrying pins 12 engaging in a circumferential groove 13 of the shaft, the free end of lever 11 being linked
5 to a connecting rod 14 located in bearings 15. A spring 16 serves for holding the lever in normal position. Axial motion of the fixed propeller 3 is prevented by claws 17, 18 fixed to the case and which overlap
10 the flange of the propeller hub.

The manner of operation of the improved air propeller drive is such that at low height only the air propeller 3 will enter into operation, whereas propeller 6 will run
15 along empty. Only after there has been created an excess of output on the part of the motor owing to a reduction of air resistance the claw coupling 7, 9 will be thrown in, so that now both propellers 3
20 and 6 will operate conjointly. With regard to the said claw coupling 7, 9, due care is taken that the angle of the propeller blades will invariably amount to 90° , so that consequently a four-bladed propeller of the
25 usual type will come to be produced.

I claim:

1. Aerial propelling device comprising in combination, a driving shaft capable of axial movement, two propellers spaced
30 apart on said shaft, one in operative, the

other in inoperative condition, means serving on said shaft being moved axially, to cause one propeller to close up with the other one and means connected with said propellers for coupling them, after they
35 have closed up.

2. Aerial propelling device comprising in combination, a driving shaft capable of axial movement, two propellers spaced apart on said shaft, one in operative, the other
40 in inoperative condition, means serving on said shaft being moved axially, to cause one propeller to close up with the other one and means connected with said propellers for coupling them at an angle of 90° , after they
45 have closed up.

3. Aerial propelling device comprising in combination, a driving shaft capable of axial movement, a propeller loose on said shaft at the end thereof another propeller
50 on said shaft spaced apart from said loose propeller, a slot and key connection between said shaft and said other propeller, an abutment to the rear of said other propeller adapted to prevent it from following the
55 axial motion of said shaft and coupling means on adjoining faces of said propellers.

In testimony whereof I affix my signature.

CLAUDIUS DORNIER.